

AN
ESSAY

UPON

PESTILENTIAL DISEASES;

SUCH AS THE

PUTRID, MALIGNANT, AND YELLOW FEVERS,
AND THE PLAGUE:

WITH

An Account of an INFECTIOUS FEVER, or PLAGUE, which broke out and raged with great Mortality on board His Majesty's Ship SURPRISE, in the Year 1776, on the Banks of Newfoundland: Upon the METHODS of PREVENTION and CURE: And especially upon the most effectual Means of DESTROYING CONTAGION, or INFECTION, by Quick-lime, and the Fumes of the Sulphuric Acid.

Together with Dr. CULLEN's Doctrine of Contagion, and the MEANS recommended by that celebrated Professor, for PREVENTING the SPREADING of INFECTION. Including Dr. J. C. SMYTH's METHOD of DESTROYING CONTAGION by the Fumes of the Nitrous Acid, &c.—in order to shew that the Fumes of the Vitriolic Acid are not only more powerful and more certain than the Fumes of the Nitrous Acid, for this purpose; but that the Fumes of burning Brimstone are the ONLY Means of destroying the Infection and Contagion of Epidemical Diseases.

LIKEWISE,

OCCASIONAL REMARKS upon the Effects of the Fumes of Sulphur upon Insects, Animalculæ, &c. with an infallible Method of destroying the Vermin which infest Apple-trees, causing the Canker, &c.

By JAMES RYMER, Surgeon, R. N.

LONDON:

PRINTED BY R. WILKS, CHANCERY-LANE;

And sold by H. D. SYMONDS, 20, Paternoster-row; J. HATCHARD, 190, Piccadilly; J. BELL, 148, Oxford-street; and J. ASPERNE, Cornhill.

1805.

TO THE RIGHT HONOURABLE
WILLIAM PITT,
FIRST LORD OF THE TREASURY, CHANCELLOR
OF THE EXCHEQUER, &c. &c.

SIR,

FROM the important and comprehensive purport of this Essay, I have been induced to take the liberty of dedicating it to you.

If there should be any thing pointed out in it which shall be found, in any measure, to be calculated to lessen the dreadful consequences of Pestilence, I trust, Sir, that it will meet with your hearty approbation and patronage.

I have the honour to be,

With the greatest Respect,

SIR,

Your most obedient, and

Most humble Servant,

JAMES RYMER.

AN ESSAY
UPON
PESTILENTIAL DISEASES,
&c.

AT a time when pestilence rages in various parts of the world, it is the duty of every man to come forward and publish whatever may contribute to allay, prevent, or remove, so grievous a calamity.

Having acquired some experience, as Surgeon of several of his Majesty's ships, during a service of upwards of ten years, in the treatment of infectious and contagious fevers; and having, since the year 1782, in practice both in London and the country, bestowed much attention to the means of preventing and curing such diseases, I am in great hopes that what I shall subjoin will not be altogether useless.

From the year 1770 to 1774, I served in my profession, as Surgeon, on board his Majesty's ships,

Montreal and Trident, in the Mediterranean station. We passed that time at Gibraltar, Minorca, Villa Franca, Genoa, Leghorn, Naples, Smyrna, Milo in the Archipelago, Algiers, Cadiz, and Lisbon. The prevailing complaints, on board these ships, were such as commonly occur in a healthy climate under all the favourable circumstances of wholesome provisions, cleanliness, ventilation and fumigation; proper clothing, due hours of duty and rest; temperance, and consistent discipline.

Excepting some cases of dysentery, and the small-pox, a few instances of the malignant quinsy, and scarlet fever, we very seldom had any fever of an infectious nature. In the spring of the year, the prevailing complaints were of the catarrhal and pneumonic kind; in the summer, we had hardly any illness; in the autumn, diarrhoea and cholera were not uncommon; and, in the winter, we had some cases of the scarlet fever, and the malignant sore throat.

In the Montreal, James Alms, Esq. Commander, there being a war between the Russians and the Turks, we spent some weeks at Smyrna, in the autumn of 1771, where the flashes of lightning were every night so universal and vivid, that we saw the
surrounding

surrounding mountains, and other objects, as distinctly as in day-light. The air here was in general very damp. The prevalent complaints were colds, rheumatism and lumbago, and other slight febrile affections.

All that I could gather here concerning the plague, was, that an infectious fever, commonly called the plague in these countries, happens now and then; that it prevails mostly among the lower orders of the people; that it is propagated by infected persons, articles of trade, &c. and that the filthy habits, and indolence, of the meaner sorts, were also occasional sources of infection.

Body linen and clothes worn unchanged for a length of time, in such climates, and saturated with sweat and other animal exhalations, must naturally be productive of stench, and morbid effluvia; on the other hand, contagion apart, health is generally the companion of cleanliness.

In 1772, on board his Majesty's ship *Trident*, Captain Ellis, bearing the flag of Admiral Sir Peter Dennis, Bart. we anchored in the roads of *Baja*, some miles south of Naples, where we staid about three months, surrounded by Nero's baths, the ruins of the ancient city of *Baja*, *Puzzuoli*, &c. From every

fissure of the earth, hereabouts, issued a sulphureous smoke; the sand and sea-water at the shore were, in places, nearly at the boiling point of Fahrenheit's thermometer; and, in going ashore to Puzzuoli, in the ship's boats, we could see under water the chimneys and walls of houses—ruins of Baja, now overwhelmed by the sea, occasioned, many ages ago, by earthquakes—an awful, mournful sight.—*Sic transit gloria mundi!*

From our anchorage in the roads of *Baja*, we had a fair view of Mount Vesuvius, pouring forth vast columns of dense black smoke in the day; and in the night the appearance was that of flames and embers, and masses of red-hot stones and blocks, thrown up into the air.

Not far from *Baja* is the *Solfaterra*, a mountain, formerly a volcano, into whose basin or crater I descended, and observed at the bottom, towards the N. E. side, caverns, whence issued sulphureous smoke and vapours; and around the mouths of many smaller openings, here and there, were crystallizations, like clusters of rubies and topazes, of most beautiful arrangement and colour.

Upon enquiry at Naples and Puzzuoli, I understood that contagious fevers were rare and of short duration;

duration; which blessings they attributed to the favour of *St. Januarius*, but which may be more rationally and scientifically ascribed to one of the most powerful agents in nature, viz. the vitriolic acid volatilized, or in a state of vapour, as it arises from the combustion or burning of sulphur.

In the air of this country, which I conceive to be very healthy, we had scarcely one man upon the sick list during our stay. Some of the men, who supposed themselves troubled with chronic rheumatism, sciatica and lumbago; and others, who had eruptions of the herpetic and syphilitic kind; went naked daily into one of Nero's baths, which are caves or excavations of a rocky promontory, constantly full of sulphureous smoke and vapour, issuing from numerous fissures and apertures. These men received much benefit from such exposure: and in particular I well recollect Lieutenant Samuel Graves, who had many copper-coloured blotches, and much scurf, upon his shoulders and arms. They went into these caves or baths with lighted candles in lanterns; notwithstanding which, the steam was so dense that they could hardly see any thing else. The temperature of this vapour was so high as to cause them to sweat profusely in a short time.

When occasions pointed out the propriety of fumigating the ship, stoves were placed, on shingle-ballast, between decks ; and pieces of old rope, junk, and tobacco leaves, with some saltpetre and a few brimstone matches, were set fire to, so as to make a smothering fire : the scuttles, ports, and hatchways, were then closed for an hour or two, when the fires were put out : but the scuttles, ports, and hatchways, were previously opened, to allow a sufficient time for the dispersion and escape of the smoke and sulphureous vapour.

During the whole course of this station, we had not one instance of the sea-scurvy. But when it is considered, that the people had almost constant supplies of fresh meat, vegetables and fruit, and very often fermented or leavened bread ; and that each man had a pint of wine served to him daily ; it would have been a wonderful event indeed, if that disease had at all made its appearance.

I spent great part of the year 1775 in the West Indies, where nothing in particular occurred with respect to disease.

In January 1776, I was appointed Surgeon of his Majesty's ship *Surprise*, Robert Linzee, Esq. Commander. In March following, we were one of a
squadron

squadron under the command of Sir Charles Douglas, Bart. and sailed from Plymouth Sound with transports and troops for the relief of Quebec, then besieged by the Americans. This service being performed, we sailed from Quebec to Newfoundland, as one of the ships for the protection of the fishery there. From Plymouth Sound to Quebec, and from the latter place to Newfoundland, our ship's company had been very healthy.

Before I proceed further, it will be proper to consider the origin and nature of contagion and miasmata.

The learned and celebrated Dr. Cullen, in his *First Lines of the Practice of Physic*, delivers himself upon this subject as follows :

“ As fever has been held to consist chiefly in an increased action of the heart and arteries, physicians have supposed its remote causes to be certain direct stimulants fitted to produce this increased action. In many cases, however, there is no evidence of such stimulants being applied ; and in those in which they are applied, they either produce only a temporary frequency of the pulse, which cannot be considered as a disease ; or, if they do produce a permanent febrile state, it is by the intervention of a topical
 B 4 inflammation,

inflammation, which produces a disease different from what is strictly called fever.

“ That direct stimulants are the remote causes of fever seems further improbable ; because the supposition does not account for the phenomena attending the accession of fevers : and because other remote causes can with greater certainty be assigned.

“ As fevers are so generally epidemic, it is probable, that some matter floating in the atmosphere, and applied to the bodies of men, ought to be considered as the remote cause of fevers : and these matters, present in the atmosphere, and thus acting upon men, may be considered either as contagions, that is, effluvia arising directly or originally from the body of a man under a particular disease, and exciting the same kind of disease in the body of the person to whom they are applied ; or *miasmata*, that is, effluvia arising from other substances than the bodies of men, producing a disease in the person to whom they are applied.

“ It is now well known, that the effluvia constantly arising from the living human body, if long retained in the same place, without being diffused in the atmosphere, acquire a singular virulence ; and in that state,
being

being applied to the bodies of men, become the cause of a fever which is highly contagious.

“ The existence of such a cause is fully proved by the late Observations on Jail and Hospital Fevers ; and, that the same virulent matter may be produced in many other places, must be sufficiently obvious ; and it is probable that the contagion arising in this manner is not like many other contagions, permanent and constantly existing ; but that, in the circumstances mentioned, it is occasionally generated : at the same time, the nature of the fevers from thence upon different occasions arising, renders it probable that the virulent state of human effluvia is the common cause of them, as they differ only in a state of their symptoms ; which may be imputed to the circumstances of season, climate, &c. concurring with the contagion, and modifying its force.

“ With respect to these contagions, though we have spoken of them as of a matter floating in the atmosphere, it is proper to observe, that they are never found to act but when they are near to the sources from whence they arise ; that is, either near to the bodies of men, from which they immediately issue, or near to some substances, which, as having been near to the bodies of men, are imbued with their
effluvia,

effluvia, and in which substances these effluvia are sometimes retained in an active state for a very long time.

“ The substances thus imbued with an active and infectious matter may be called *fomites*; and it appears to me probable, that contagions, as they arise from fomites, are more powerful than as they arise immediately from the human body.

“ Miasmata are next to be considered: they may arise from various sources, and be of different kinds; but we know little of their variety, or of their several effects. We know with certainty only one species of miasma which can be considered as the cause of fever; and, from the universality of this, it may be doubted if there be any other.

“ The miasma so universally the cause of fever, is that which arises from marshes or moist ground, acted upon by heat. So many observations have now been made with respect to this, in so many different regions of the earth, that there is neither any doubt of its being in general a cause of fevers, nor of its being very universally the cause of intermittent fevers, in all their different forms. The similarity of the climate, season, and soil, in the different countries in which intermittents arise, and the similarity of the diseases, though arising in different regions, concur in proving that

that there is one common cause of these diseases, and that this is the marsh miasma.

“What is the particular nature of this miasma, we know not; nor do we certainly know whether or not it differs in kind; but it is probable that it does not, and that it varies only in the degree of its power, or perhaps as to its quantity in a given space.

“It is now rendered probable that the remote causes of fevers are chiefly *contagions* or *miasmata*, and neither of them of great variety. We have supposed that miasmata are the cause of intermittents, and contagions the cause of continued fevers, strictly so named; but we cannot with propriety employ these general terms. For as the cause of continued fevers may arise from fomites, and may, in such cases, be called a miasma; and as other miasmata also may produce contagious diseases; it will be proper to distinguish the causes of fevers, by using the terms *human* or *marsh effluvia*, rather than the general ones of contagion or miasma.

“To render our doctrine of fever consistent and complete, it is necessary to add here, that those remote causes of fever, human and marsh effluvia, seem to be of a debilitating or sedative quality. They arise from a putrescent matter. Their production is favoured, and
their

their power increased, by circumstances which favour putrefaction ; and they often prove putrefactive ferments, with respect to the animal fluids. As putrid matter, therefore, is always, with respect to animal bodies, a powerful sedative, so it can hardly be doubted that human and marsh effluvia are of the same quality ; and it is confirmed by this that the debility which is always induced, seems to be in proportion to the other marks that appear of the power of those causes."

We had been now upon the Newfoundland station from the beginning of June till about the end of August, seldom in harbours, but generally cruising upon the banks, in such dense fogs, that, for the most part, we could hardly see the jib-boom from the quarter-deck ; and the air so moist that all cold bodies exposed to it were completely wetted by the condensed vapour, which trickled down in drops from the cannon, &c. The people hitherto had enjoyed good health ; but, about the beginning of September, a malignant fever of a peculiar virulence and fatality made its appearance. This occurrence was the more extraordinary, as we had not been exposed to any infection or contagion whatever, either bodily, or by goods or things of any kind of a suspicious nature. The usual attention had been all along paid to the general rules
and

and regulations for the preservation of health, excepting that the hammocks and bedding could not be well aired in so moist an atmosphere. The people, in addition to the common run of sea provisions, had daily supplies of fresh codfish, which were caught in abundance. How, then, was the generation of this contagion to be accounted for? The only probable source must have been, the conjoint action of heat and moisture, and the exhalations and effluvia of the men in their confined and damp situation between decks. Possibly, some of the people might have been generally filthy and negligent in changing their check shirts, &c. unknown to the officers.

It being of the utmost importance to ascertain the origin of contagion, I shall, in this place, again quote from Dr. Cullen's First Lines, his words concerning the specific contagion of the dysentery.

“ The dysentery does often manifestly arise from the application of cold; but the disease is always contagious; and by the propagation of such contagion, independently of cold, or other exciting causes, it becomes epidemic, in camps and other places. It is, therefore, to be doubted, if the application of cold does ever produce the disease, unless where the specific contagion has been previously received into the
body :

body: and, upon the whole, it is probable that a specific contagion is to be considered as always the remote cause of the disease.

“ Whether this contagion, like many others, be of a permanent nature, and only shews its effects in certain circumstances which render it active, or if it be occasionally produced, I cannot determine. Neither, if the latter supposition be received, can I say by what means it may be generated. As little do we know any thing of its nature, considered in itself; or at most this only, that, in common with many other contagions, it appears to be commonly of a putrid nature, and capable of inducing a putrescent tendency in the human body. This, however, does not at all explain its peculiar power in inducing these symptoms, which properly and essentially constitute the disease of dysentery.”

The mere odour, or effluvia, from an animal body in a state of putrefaction, which did not die of an infectious disease, will not induce any putrescent tendency in the living body; but if the putrid matter of a dead body, under such circumstances, were applied to a fresh puncture or wound, as in the case of inoculation for the small-pox, a virulent putrid fever would, in all probability, be the consequence. The putrid ferment,
thus

thus applied, would be absorbed into the circulating system, and prove deleterious. The late ingenious and indefatigable anatomist, Mr. Faulkner, of Craven-street, Strand, by cutting a finger when dissecting a putrid body, was soon thereafter seized with a malignant fever, which ended fatally in a few days.

I recollect a saying of the late Dr. William Hunter's, when I attended his lectures upon Anatomy, many years ago. The Doctor was delivering his lecture to a crowded audience, having a putrid and very offensive body upon the table before him ; and observing several of his pupils putting their handkerchiefs to their noses, the Doctor said, Gentlemen, you need not be afraid, there is no harm in this smell : for my own part, I have always found such odours quite refreshing.—However true this might have been (and I cannot suppose that so correct a man, as Dr. Hunter was, would treat so grave a subject with levity), I am of opinion, that if dead bodies for anatomical purposes underwent proper ablution in quick-lime and water, whereby all putrescent slime and other noxious matter would be removed, the danger, upon dissection, would be lessened. Quick-lime in such cases is powerfully antiseptic ; that is, by its causticity it effectually changes the nature of putrid animal matter, rendering it inert

and

and harmless; or, in other words, putrid animal matter is decomposed by quick-lime. Clothes and bedding, &c. imbued with infectious effluvia, should be first fumigated with the vapour of burning brimstone; and, after a due time, scoured in quick-lime and water, and then hung out in the open air, to dry. By such precautions, much serious mischief would be prevented.

It is probable that, for similar reasons, in Spain, the South of France, and in Italy, they bury their dead in quick-lime. Being one day in the principal church of Port-Mahon, in Minorca, I observed a circular *grating* in the center of the floor of the church; and, upon enquiring the use of it, was told that the dead bodies were let down through this opening into the vault underneath, which contained quick-lime, in order to the speedy destruction of the soft parts of the bodies, and to prevent infection. Upon this occasion it is proper to remark, that, unless the quick-lime be frequently and occasionally renewed, these ends will not be obtained. Quick-lime, by exposure to the open air, loses its causticity, crumbling into small particles by absorbing or combining with the æreal acid and watery vapour, whereby it is converted into its former or original state of calcareous earth; and in this condition

condition it is called flaked lime; which may be again changed into quick-lime by a second calcination, in which process, fixed air, which constitutes about one-third of the weight of lime-stone or chalk, is extricated.

But, to return :—The disease, as I observed above, which broke out on board his Majesty's ship *Surprise* in the beginning of September, was of such a character as I had never met with before. The two principal symptoms upon the attack, were,

1st. Extreme debility of the mental, vital, and animal functions. The patients staggered like drunken men, and often fell down in fainting fits.

2dly. Sudden and profuse hæmorrhage from the nose. They also, in the beginning of the disease, complained of stupor, head-ach and giddiness, with faintness, sickness at stomach, vomiting, and sometimes, purging. The countenance of the fresh-coloured, was livid and shrunk; of others pale and cadaverous. Some had sudden flushings, which as suddenly disappeared, leaving the whole countenance shrivelled and of a death-like whiteness, with tremulous lips and chattering of the teeth, upon which they shivered universally with sensations of extreme cold. The whole muscular system, including the

heart and arteries, seemed to be almost deprived of their powers ; the debility being so great and universal. The pulse was irregular and intermittent ; alternately small, quick, and thready ; strong, full, and hard. The delirium, which in all soon took place, was seldom fierce, generally mild ; and the *sensorium commune* rather comatose. In the progress of the disease, livid and black-coloured spots and blotches appeared upon various parts of the body. The tongue was black and tremulous. The thirst was not very urgent. The eyes were dull and dejected. In general, the disease terminated fatally on the second and third day from the seizure ; and some, even of the strongest men, died in about twenty-four hours ; so virulent and deadly was the nature of this peculiar contagion.

I treated this pestilential fever as follows. Immediately upon the attack I gave an emetic, and after its operation, if no stools soon followed, a purge of powder of jalap and calomel. And, after the operation of this purgative, I administered the bark every hour, every second hour, and every third hour, according as the stomach bore it, and as patients could be prevailed upon to take it, in the quantity of from half to a whole drachm of the powder mixed in two ounces of port wine, together with from ten to fifteen drops

drops of the elixir of vitriol, during the day. At night, on the second day from the attack, I gave each patient, whose stomach could bear it, from seven to ten grains of Dr. James's fever powder; and I found that whenever this medicine produced *diaphoresis* or sweating, which it commonly did, it was of great service in moderating the delirium, and the deranged action of the heart and arteries. But after vomiting, purging, and sweating, my chief hopes were in the antiseptic and cordial virtues of the bark, wine, and elixir of vitriol.

Instead of James's powder, to those whose stomachs would hardly retain any medicine, I gave a draught composed of half an ounce of Mindererus' spirit, two drachms of paregoric elixir, two ounces of barley-water, and a little syrup, with excellent effect, every hour, till the draughts produced a copious sweating.

In the course of this month, we lost many men; and it was no uncommon occurrence to see three or four dead bodies committed to the deep, daily.

About this time I met with a heavy misfortune. My mate failed with the fever. His activity, diligence, and humanity, had been conspicuous and deserving of every praise during our severe affliction. I treated him as above stated, and he had the good fortune to

recover, and was able to resume his duty in about ten days.

Water-gruel, rice-gruel, and fago, with ginger or mace, or nutmeg and sugar, were the common drinks, and indeed nourishment, in the disease.

To overcome the stench and offensive vapours in the sick birth, the steam of boiling vinegar, and camphire previously dissolved in a little rectified spirit of wine, were used: and by the frequent burning of a brimstone match, so as not to offend respiration, I am convinced that great beneficial effects resulted. We persevered in those means till our arrival at Spithead, in November, when all the sick on board were sent to Haslar hospital. The ship was then fumigated, not only in the accustomed way of the navy, but with the fumes of burning brimstone, and washed between decks with quick-lime and water, which, altogether, were productive of the most happy effects.

Our method of fumigating was this: a ship's stove was placed in each bay or sick birth, having combustible articles properly arranged, viz. bits of old rope, junk, cannon matches, slips of deal board, and shreds of coarse linen or canvass, incruited with sulphur by dipping them in melted brimstone: and one or two more of the same stoves were placed between decks, with

with the same materials. As soon as the fires were lighted, and all the men upon deck, the scuttles were shut, and all the gratings of the hatchways covered with tarpaulins, to confine the smoke and fumes. In the course of an hour or two, the scuttles and hatchways, being previously opened, and due time given for the dissipation of the sulphuric vapours, the people went below to extinguish the remaining embers in the stoves, &c. The chief precaution, in fumigating with brimstone, is carefully to avoid inhaling or breathing or inspiring the fumes arising from the burning matters. When they are diffused in the air, and so diluted therein as not to be in anywise suffocating, no inconvenience will happen to any one, though the lungs be ever so irritable and tender.

That the reader may be enabled to judge how far the above disease was analogous to the plague, I shall here insert the symptoms of the latter, as enumerated by Dr. Cullen, in his First Lines.

“ 1st, The great loss of strength in the animal functions, which often appears early in the disease.

“ 2dly, The stupor, giddiness, and consequent staggering, which resembles drunkenness, or the head-ach, and various delirium; which are all of them

symptoms denoting a great disorder in the functions of the brain.

“ 3dly, The anxiety, palpitation, and syncope, and especially the weakness and irregularity of the pulse, which denote a considerable disturbance in the action of the heart.

“ 4thly, The nausea and vomiting, particularly the vomiting of bile, which shews an accumulation of vitiated bile in the gall bladder and biliary ducts, and from thence derived into the intestines and stomach; all of which symptoms I suppose to denote a considerable spasm and loss of tone in the extreme vessels on the surface of the body.

“ 5thly, The buboes or carbuncles, which denote an acrimony prevailing in the fluids. And,

“ Lastly, the petechiæ, hæmorrhages, and colliquative diarrhœa, which denote a putrescent tendency prevailing to a great degree in the mass of blood.”

If the above symptoms of the plague, from Dr. Cullen, be compared with the symptoms of the disease which raged so fatally on board the *Surprise*, there can be no doubt but that it was of the nature of the plague. Excepting the fifth symptoms of Dr. Cullen, viz. buboes or carbuncles, all the others coincide with

with our disease. We had no abscesses or imposthumations. Upon the whole, it may be concluded, that our contagion was one of a most putrescent, deleterious, malignant, and narcotic, nature.

My health having suffered by the anxiety and fatigue consequent of our late sickness on board his Majesty's ship *Surprise*, I took the liberty of representing the same to the Honourable the Commissioners of the Navy, humbly requesting an appointment to some ship upon the home station, with a view to the re-establishment of my health. They had the goodness to listen to my request, and appointed me surgeon of his Majesty's ship *Alderney*, William Webster, esq. commander, upon the North Sea station, the rendezvous of which was Yarmouth Roads.

I continued upon the above station till the spring of 1778, when I was appointed surgeon of his Majesty's ship *Conquestador*, Samuel Thompson, esq. commander, having Admiral Campbell's flag flying, as commander in chief of his Majesty's ships and vessels in that quarter.

On board the *Alderney*, nothing medical occurred worthy of notice. But the *Conquestador* being a guardship for the reception of volunteers and impressed men for his Majesty's navy, we were often exposed to

infection, by various miserable volunteers from London. Many of these unfortunate persons were what are commonly called "*jail birds*," so squalid and offensive as to require immediate stripping, and ablu-
tion in quick-lime and water; when, being well scoured and dried, by rubbing them with dry cloths, they were furnished with clean new shirts; comforts which they had not, probably, enjoyed for months before. They were, moreover, provided with new jackets, trowsers, stockings, and shoes; their old garments being carefully committed to the deep by sinking them with ballast. Notwithstanding these precautions, fevers, apparently of an infectious nature, sometimes appeared. But, as the nature of the service required that such patients should not remain on board, they were speedily removed to the hospital ship at Sheerness. By repeated fumigation, ventilation, and other attentions to the preservation of health, this ship was, upon the whole, remarkably healthy.

In the winter of 1779, Captain Thompson was appointed commander of his Majesty's ship *America*; and there being a vacancy in that ship for surgeon, he did me the honour to request the Commissioners of the Navy to appoint me to fill it. Having obtained my warrant, I joined that ship accordingly, in Portsmouth harbour, where

where she was then fitting out for the North-America station.

That I may not intrude upon the reader, I shall briefly state that, shortly thereafter, we joined a squadron of five ships of the line in Plymouth Sound, under the command of Admiral Graves, in the London, and sailed from thence, in March, for New York.

The only occurrence worth mentioning, on board the America, and, indeed, on board all the other ships of this squadron, was, that the sea scurvy broke out and, raged with great violence, after we had been about three weeks at sea; when our stock of fresh meat, vegetables, and small beer, being exhausted, the people were put upon the usual sea diet of salt beef and pork, salt butter, cheese, *burgoo*, pease soup; and grog, or rum and water, for drink. The sea scurvy being a disease of the blood, wherein one of its constituent parts, the coagulable lymph, gluten, or *crassamentum*, gradually and almost totally disappears *, in consequence of a sudden and essential

* Whence hæmorrhages, extravasations, suffusion, &c. symptoms so very different from those attending that state of blood which occurs in that order of diseases, called Phlegmasiæ, or inflammations, in Dr. Cullen's Nosology; in which the buffy coat, or inflammatory crust, so much abounds.

change

change of food and drink, it was in vain that we attempted the cure by any galenical or chemical means then in our possession *. Many men were carried off by this disease on the passage to Sandy Hook. Upon our arrival we proceeded up the river, and anchored off Staten Island, where the sick were landed and lodged in tents, and put upon a diet of fresh beef, leavened or fermented bread, vegetables and fruit, and good malt liquor, which cured them all in a rapid manner.

It is worthy of remark that the superior officers of all the ships of this Squadron, having had a sufficient stock of sheep, hogs, and poultry, wine and malt liquors, entirely escaped the disease.

I shall now proceed to the main object of this publication, namely—the most effectual means of destroying the infection or contagion of epidemical diseases.

I am not only conclusively of opinion, but convinced, that the vitriolic acid, in a volatile state, effectually destroys every specific human contagion. The vitriolic acid, in its fixed state, burns, consumes, or

* If the reader desires particular information of this voyage, and upon this disease especially, he is respectfully referred to the author's "Chemical Reflections upon the Scurvy of Mariners."

decomposes, every animal and vegetable substance with which it is in contact. The vitriolic acid, volatilized by the combustion of sulphur in the open air, is infallibly destructive of every species and variety of insects and animalculæ. The fumes of the vitriolic acid, as set at liberty by the burning of brimstone, are so subtile, penetrating, and powerful, as to render inert and harmless the most active effluvia of human bodies. Indeed, nothing organized, floating in the air, (and I do conceive all infections and contagious atoms to subsist in some such form) however minute, of an animal or vegetable nature, can possibly withstand their effects.

The power of this universal agent will be readily acknowledged, from a view of some of its more familiar effects. Is it required to destroy the bees in a hive, expose them to the vapours of burning brimstone, and they will be instantly killed. Do you wish to destroy the *ova* or eggs of insects, or the insects themselves, upon vegetables, shrubs, trees, &c.—it may be quickly accomplished by the proper application of the sulphuric fumes. In this way, bugs, and vermin of all kinds, as well as mice and rats, may be got rid of. The itch, which is a disease of the skin, occasioned by animalculæ, is effectually cured by the vitriolic acid

mixed

mixed with hogs-lard ; or by an ointment composed of sulphur and lard ; when the vitriolic acid of the sulphur acts upon the insects in the pustules, and kills them.

The apple-trees in this place and neighbourhood are generally liable to the canker. The substratum of our light soil is sand. The gardeners say that when the roots of the trees penetrate this bed of sand, the canker appears. For some years back, I have observed numerous patches upon my apple-trees, like a white mildew, or rather of a downy and mealy appearance. Last summer, I had the curiosity to examine them particularly. I brushed off the down or meal from patches, and observed underneath the same hordes of insects, devouring the bark of the tree down to the wood. I immediately concluded that such vermin ought to be destroyed. It was not convenient to apply the fumes of burning brimstone to them all ; I therefore contrived an ointment, consisting of one part of the flowers of sulphur and two parts of hogs-lard, made by melting the lard in an earthen pipkin, and then mixing the flowers of sulphur therewith by stirring it with a painter's brush. When this ointment was so far cooled as to be of the consistence of paint or honey, but not stiffer, I gave each patch a good
dose

dose of the same with the painter's brush, working it well into the patches and crevices. The vermin were thereby completely destroyed. Nothing was afterwards to be seen but the yellow dawbs of the ointment, which, of course, I suffered to remain.

With respect to contagion, we have a decisive proof of the power of the fumes of burning brimstone in destroying its activity, in the instance of the variolous matter being rendered inert by due exposure thereto. The matter of the small-pox, in what may be called its condensed or fixed state, as taken from a pustule, being duly exposed to the action of the sulphuric vapour, will not communicate the disease by inoculation: and it is highly probable that the volatile particles of the variolous contagion floating in the air of chambers, &c. would be rendered harmless by the action of the vitriolic fumes. As those fumes instantaneously combine with, and neutralize, whatever atoms of an animal nature are exposed to them, is it not probable that the volatilized vitriolic acid would destroy the matter of human contagion, whether in a fixed or volatile state? fixed, as condensed upon clothes, bedding, furniture, or goods of any kind; or volatile, as diffused in the air, &c.

I not only suppose the fumes of burning sulphur to be

be a certain antidote of human contagion, but also of the second kind of infection, viz. marsh *miasmata*, or those effluvia arising from the stagnation and putrefaction of vegetable matters in marshy grounds, &c. producing intermittent fevers or agues, wherever it might be necessary and practicable to apply this antidote in sufficient quantity and extent.

Upon the above grounds it is, that contagious diseases happen so rarely in cities, where the general fuel consists of pit-coal, which abounds with a kind of pyrites or sulphureous combinations. It is observed of London, in Brookes's Gazetteer, "that the common firing is pit-coal, commonly called sea-coal, of which there is consumed upwards of 600,000 chaldrons every year. This renders the air gross, but then it has a salutary effect in preserving the city from pestilential distempers; and the same has been observed of some cities in Germany; whereas, when wood was the chief fuel, the plague returned every ten years."

Dr. Watson, in his chemical essays, says, "though the reader may have never contemplated the various species of the pyrites, in any cabinet of natural history, or taken notice of such kinds as are commonly to be met with in chalk-pits, in beds of clay, or upon the

sea-

sea-shore in many places of England, yet the yellowish matter often adhering to, or mixed with pit-coal, cannot surely have escaped his observation; that matter consists of sulphur and iron."

In coal-pits there are layers of pyrites in the form of slate; a piece of which, being broken, has a striated, needle-like, and metalline appearance; and, being put into a brisk fire, it bursts, with loud explosions, into fragments, scattering all around bright ferruginous sparks, and diffusing a strong sulphureous smell.

The chimneys of London may be considered as a congeries, or collection of volcanos in miniature, whose smoke and sulphureous fumes, in the aggregate, must be greatly corrective of the putrid and noxious exhalations ascending and floating in its atmosphere.

If brimstone, then, shall be adopted as an antidote of human contagion, and of which I can hardly entertain the slightest doubt, it will be attended and recommended by every favourable circumstance. Brimstone, that common, but wonderful substance, that mineral phosphorus, is to be procured in abundance in all countries, and may be purchased everywhere at a cheap rate.

From a review of the effects of sulphur, in actual
combustion,

combustion, upon living creatures, it may be naturally supposed that much skill and address will be required in its use and application as a fumigation; but I do apprehend that common attention only is necessary. Any steady, intelligent person, may be employed in this respect. The chief precaution, as has already been observed, consists in avoiding the fumes arising from the burning matter. I mean, that the person holding a burning brimstone match, for example, must not breathe or inspire the smoke or fumes thereof, which are of such a suffocating nature as to cause instant death when drawn into the lungs in sufficient quantity. The most convenient, and indeed the safest form, will be that of matches, which ought to be made of thin slips of deal-board, about six inches in length, and dipped, at both ends, into the melted brimstone, so as to be coated or incruusted therewith about an inch at each end. If it be required to fumigate a sick chamber, let a match or matches be burnt just so frequently as to impregnate the air thereof sensibly with the sulphureous smell, and of such strength only as not to offend very much or oppress the lungs, in breathing. The power of the fumes may be thus regulated with the utmost precision and safety. Where it is required to fumigate infected apartments,

(in which no persons are to remain) clothes, bedding, goods, &c. matches, in due quantity, and properly arranged, may be set fire to, in stoves or other appropriate vessels, either suspended from the ceilings, or placed at such heights from the floor as may enable the person or persons kindling the fires to get away before the fumes shall have accumulated in such quantity and power as to be dangerous to respiration. During this burning of brimstone, every opening of the room should be closed, to prevent the escape of the fumes, for a reasonable time. The ingenuity, experience, and judgment, of individuals, will naturally suggest such other ways of fumigation with burning brimstone as may be thought proper, applicable, and expedient.

Doctor I. C. Smyth, in his valuable work upon the jail distemper, and the means for destroying the contagion thereof, namely, by the nitrous acid in a state of vapour, has the following words, with respect to the sulphureous acid :

“ The well known efficacy of the sulphureous acid, in destroying contagion, is a sufficient reason for our continuing to use it as a fumigation for clothes, furniture, &c. The nitrous acid, being attended with no risk or inconvenience to the respiration, and appearing,

pearing, from *our* experience, of sufficient efficacy to prevent the farther spreading of contagion, seems the proper antidote to be applied in all situations where persons are necessarily present ; and is, in short, the *desideratum* sought after by the benevolent Dr. Lind.

“ For purifying empty hospital or prison wards, and ships, I should also prefer the nitrous acid to the sulphureous, as *I believe* it to be equally efficacious ; its vapour is more volatile and penetrating ; and it does not leave the disagreeable smell which sulphur does. But, for this particular object, I think it would be advisable to make trial also of the marine acid, and of the mixture of the nitrous and marine acids ; as I am convinced of the efficacy of all the mineral acids, for destroying contagion ; and *our* experience is not yet sufficient to determine *their* relative advantages and disadvantages.”

While I, in common with the public, allow Dr. Smyth to be highly deserving of the honours bestowed upon him for his labours in this field ; yet, upon perusal of the above paragraphs, the first emotions in the mind of the reader may lead him to ask,

1st. If the sulphureous acid be well known to be effectual in the destruction of contagion, as a fumigation

gation for clothes, furniture, &c. will it not be equally efficacious in destroying contagion in the chambers of the infected?

If the fumes of sulphur can destroy contagion in its condensed or fixed state, in furniture, and secreted and confined in clothes, goods, &c. how much more and immediately active must they be upon infectious particles exposed thereto in the open air, where nothing intervenes to obstruct their instant action? The consideration of risk and inconvenience ought to be entirely laid aside where we have to contend with so formidable an enemy as the plague. In every arduous contest there will be risk and inconvenience; but, where the means are answerable to the end, and where we are ultimately sure of success, it would surely be trifling with one of the most dreadful of all physical evils, if we forbore to attack it with all our might.

2dly. Why we should relinquish a well-known and efficacious remedy, for one less known, less efficacious, less powerful, and less established? The vitriolic acid is the most powerful of all the acids, mineral and vegetable, and decomposes every combination by other acids, dislodging them, and occupying their places with their bases, forming, therewith, new and different

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compounds.

compounds. Upon this principle it is that Dr. Smyth sets at liberty the nitrous acid from its base, by adding the vitriolic acid to nitre. His words upon this subject are :

“ To obtain the nitrous or marine acid, in a state of vapour, the method is extremely simple. It consists in decomposing nitre or common salt by means of heated vitriolic acid, which may be done as follows :

“ Put half an ounce of vitriolic acid into a crucible, or into a glass or china cup, or deep faucer ; warm this over a lamp or in heated sand, adding to it, from time to time, some nitre or common salt : these vessels should be placed at twenty or thirty-feet distance from each other, according to the height of the cieling, or virulence of the contagion. In hospitals, or prisons, the lamps or vessels containing heated sand may be placed on the floor ; on board ships, it will be better to hang them to the cieling by waxed threads.”

The above method of decomposing nitre or common salt by the vitriolic acid is correctly scientific, and agreeable to the rules and principles of chemistry ; but some readers may not be aware that the nitrous acid is, of its own nature, volatile in the common temperature

temperature of the air. Maquer, in his excellent book on the theory and practice of chemistry, says, "If the nitrous acid be dephlegmated, or contain but little superfluous water, it exhales in reddish vapours; these vapours, being condensed and collected, form a liquor of a brownish yellow, that incessantly emits vapours of the same colour, and of a pungent, disagreeable smell. These characters have procured it the name of *smoking spirit of nitre*, &c. This property in the nitrous acid, of exhaling in vapours, shews it to be less fixed than the vitriolic acid; for the latter, though ever so thoroughly dephlegmated, never yields any vapours, nor has it any smell."

From the above extract it appears that if a small quantity of the dephlegmated nitrous acid, say half an ounce, were poured into each crucible, glass, china cup or saucer, placed in vessels containing heated sand, or not, every purpose, it is presumed, would be answered as well as by the process so scientifically recommended by Dr. Smyth, wherever the fumes of the nitrous acid are required to be used as an antidote of contagion.

The learned and benevolent Dr. Buchan, upon the subject of the infection of fevers, in his valuable and

deservedly popular work, *Domestic Medicine*, makes use of the following words:

“The clothes, bedding, &c. of the sick ought to be carefully washed, and fumigated with brimstone. Infection will lodge a long time in dirty clothes, and afterwards break out in the most terrible manner.” With all due deference to this respectable physician, upon the above I have only to recommend that the clothes, bedding, &c. of the sick, ought first to be fumigated with the fumes of burning brimstone, and afterwards carefully scoured in quick-lime and water, and then hung out in the open air to dry.—Upon a subject of such vast importance as the prevention of epidemical fevers, especially the plague, I hope I shall stand excused for laying before the reader, the means recommended by Dr. Cullen, in his First Lines.

“With respect to the prevention: as we are firmly persuaded that the disease never arises in the northern parts of Europe, but in consequence of its being imported from some other country; so the first measure necessary, is the magistrates taking care to prevent the importation: and this may generally be done by a due attention to bills of health, and to the proper performance of quarantine.

“With

“ With respect to the latter, we are persuaded that the quarantine of persons may safely be much less than forty days; and if this were allowed, the execution of the quarantine would be more exact and certain, as the temptation to break it would be in a great measure removed.

“ With respect to the quarantine of goods: it cannot be perfect, unless the suspected goods be unpacked and daily ventilated, as well as the other means employed for correcting the infection they may carry: and, if all this were properly done, it is probable that the time commonly prescribed for the quarantine of goods might also be shortened.

“ A second measure, in the way of prevention, becomes requisite, when an infection has reached and prevailed in any place, to prevent that infection from spreading into other places. This can be done only by preventing the inhabitants, or the goods of any infected place, from going out of it, till they have undergone a proper quarantine.

“ The third measure for prevention, to be employed with great care, is to hinder the infection from spreading among the inhabitants of the place in which it has arisen. We infer, that all persons who can

avoid any near communication with infected persons, or goods, may escape infection.

“ For avoiding such communication, a great deal may be done by the magistrate, 1, By allowing as many of the inhabitants as are free from the infection, and not necessary to the service of the place, to go out of it. 2, By prohibiting all assemblies, or unnecessary intercourse, of the people. 3, By taking care that necessary communications be performed without contact. 4, By making such arrangements and provisions as may render it easy for the families remaining, to shut themselves up in their own houses. 5, By allowing persons to quit houses in which an infection appears, upon condition that they go into lazarettos. 6, By ventilating and purifying, or destroying at the public expence, all infected goods. Lastly, by avoiding hospitals, and providing separate apartments for infected persons,

“ Of those obliged to remain in infected places, but not obliged to have any near communication with the sick, they may be preserved from the contagion by avoiding all near communication with other persons or their goods ; and it is probable that a small distance will answer the purpose, if at the same time
there

there be no stream of air to carry the effluvia, of persons or goods, to some distance.

“ The bodies of men are especially liable to be affected by contagion, when they are anywise considerably weakened by want of food, and even by a scanty diet or one of little nourishment; by intemperance in drinking, which, when the stupor of intoxication is over, leaves the body in a weakened state; by excess in ‘*animal appetites* ;’ by great fatigue; or by any considerable evacuation.

“ A full diet of animal food increases the irritability of the body, and favours the operation of contagion; and indigestion, whether from the quantity or quality of food, has the same effect.

“ Besides giving attention to obviate the several circumstances which favour the operation of contagion, it is probable that some means may be employed for strengthening the bodies of men, and thereby enabling them to resist contagion.

“ For this purpose, it is probable that the moderate use of wine, or of spirituous liquors, may have a good effect.

“ It is probable that some medicines also may be useful in enabling men to resist infection: but amongst these

these I can hardly admit the numerous alexipharmics formerly proposed ; or, at least, very few of them, and those only of tonic power. Amongst these last we reckon the Peruvian bark ; and it is, perhaps, the most effectual. If any thing is to be expected from antiseptics, I think camphire, whether internally or externally employed, is one of the most promising.

“ It would probably contribute much to check the progress of infection, if the poor were enjoined to make a frequent change of clothing, and were suitably provided for that purpose ; and if they were, at the same time, induced to make a frequent ventilation of their houses and furniture.” — Thus far Dr. Cullen.

With respect to medicines for strengthening the bodies of men, and thereby enabling them to resist the operation of infection, it is with the utmost satisfaction that I can, with confidence, recommend one, of my own invention and preparation.

By reports, from various parts of the world, of the good effects of that patent medicine, the Cardiac and Nervous Tincture, as a preventive of infectious fevers, it appears that this medicine has been used with the greatest success by persons exposed to contagion in
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the West Indies and America: and, from my own experience, I can confirm such testimonies, and fairly assert that it is a most powerful tonic and antiseptic, and at the same time it is gently aperient. To my own certain knowledge, it has met with great approbation during many years past, not only by most of the faculty, who keep it constantly in their shops for occasional prescription, but by persons who had occasion to take it in their avocations in the criminal courts of these kingdoms.

The dose of this medicine, as a preventive, where persons are constantly exposed to the infection of fevers, is from one to three tea-spoonfuls in a glass of cold water, or wine, fasting, at noon; and at six in the evening. But, for occasional purposes, the same quantities may be taken before breakfast and dinner only, and as pointed out in the pamphlets of directions.

Of the good effects of this medicine in *typhus* or putrid and malignant fevers, the following is one of many instances:

Extract from RYMER'S TRACT on Dyspepsy, &c. 5th edition.

CASE LI.—TO THE FACULTY.

MALIGNANT FEVERS.

*That the following important Fact may be more generally known,
Mr. Rymer thinks it his duty to publish it.*

OF THE EFFECTS OF THE CARDIAC TINCTURE IN MALIGNANT FEVERS.

Very lately, in some cases of the *typhus nervosus*, *typhus putridus*, or the slow, nervous, putrid, malignant, petechial fever, I had remarkable instances of the good effects of this Tincture, as a *cordial* and antiseptic, antispasmodic, and diaphoretic. One patient was a young gentleman. After having treated the fever in the usual manner, with gentle emetics, diaphoretics, sudorifics (during 15 days no *diaphoresis* or sweating could be produced), antispasmodics, blister, and antiseptics, without success, I sent for Dr. Clerke, of Epsom. The symptoms at this time were the following :—Tongue (formerly white and moist) black and parched; teeth and lips furred with a black viscous kind of matter; delirium, coma, with sudden startings, restlessness, *subsultus tendinum*, picking and searching about the bed-clothes, with tremulous hands; skin, as from the beginning, dry and hot, with, at times, great degrees of flushings in the face; quick and oppressed respiration; pulse 130 in the minute; great debility and faintness, with frequent retching and hiccup; urine and stools discharged involuntarily. It appeared to Dr. Clerke, and I was also of the same opinion, that the patient would not recover. The Doctor prescribed skilfully and judiciously: and as I had only applied a blister to the back, Dr. Clerke ordered one to be applied upon the head. But, notwithstanding all that was done, the patient became worse,

worse, and could not retain the prescribed medicines. Wherefore I tried the following draught :

R. Tinct. Cardiac. drachmas duas.

Aq. Commup. unciam unam.

Vin. Antimon. guttas xx.

Sal. Nitr. pur. gr. x.

M. Ft Haust. 2da quaqu. hor. sumend.

This draught he kept down ; and from this time he became better ; the vomiting ceased, the delirium abated, he slept and was refreshed ; pulse 100. Having taken several of the above draughts, with very evident benefit, I gave the Tincture in the decoction of bark, in the proportion of drachmas duas ad unciam dimidiam, every four hours. The patient recovered. In recovering he had no speech, nor action of the muscles of the thighs and legs, for several days. The senses and faculties of the mind seemed to be very much impaired, so that he continued for many days peevish, childish, and in a state of fatuity, with a voracious appetite. He was very much wasted ; and in particular, the muscles of the thighs and legs, the flexors whereof were contracted for many days.

Of the use of the Tincture in such Fevers, further information may be had in the Seventh Edition of the above Tract, pages 86, 106, 107.

In the putrid fevers of this country, such as *cynanche maligna*, or putrid fore-throat ; and in the scarlet fever, with fore-throat, which is only a milder disease than the malignant quinsy ; after vomiting (where that operation is judged proper) and purging ; and sweating,

by

by the following draught, (to be repeated every second hour till a breathing sweat takes place)

R. Aq. Ammon. Acetat. ℥ss

Tinct. Opii camphorat. ℥ij

Mixtur. Camphorat. ℥ifs

Syrup. Tolutan. ℥ij.

M. Ft Haust. 2da quaqu. hor. sumend.

I give from one to three tea-spoonfuls of the Cardiac Tincture in a glass of port wine, where the faintness and debility are great, every two or three hours, with the best effect. In both the *cynanche maligna*, and scarlet fever, with ulcerated throat, I apply blisters around the throat, as soon as the disease is ascertained, with the greatest benefit.

In the winter of 1800, four persons of my own family were seized nearly at the same time with the scarlet fever and fore-throat; and, by treating them as above stated, they all recovered. The erysipelatous eruptions which appeared upon all of them, about the third and fourth days, were followed as usual by peeling off of the scarf-skin, &c.

The public are respectfully informed that the Cardiac Tincture is expressly prepared and put up in pint bottles, for the prevention, &c. of pestilential fevers, such as the plague, yellow fever, *cynanche maligna*,

maligna, &c. and fold, at one guinea each, by Messrs. Dicey and Sutton, No. 10, Bow-churchyard, London.

It may be expected, perhaps, that, in a publication of this nature, I should have given the formula, or prescription, and method of preparing this medicine. In answer to which, I have to observe that none but professional men could prepare it properly; individuals out of the profession could not prepare it at all; and its ingredients are not to be met with in foreign parts. I am therefore in hopes that no public inconvenience can ensue from withholding the prescription in this place.

The following letter displays the generous sentiments of a celebrated member of the profession upon this subject :

Copy of a Letter from the late eminent Surgeon, JOHN HUNTER, Esq.
to Mr. RYMER, (the original of which is in his possession) :

SIR, Being acquainted with the merits of your medicine, I shall be one of the first to recommend it. It is immaterial whether any one knows the composition of it or not, if he knows its effects, which is all that is necessary to be known. Whenever I have an opportunity of giving it a preference to other medicines, or when I think a trial of it should be made, I shall not have the least objection because it passes as a quack medicine; more
especially

especially as I know its composition. Your book is so many proofs of its efficacy. I wish you all success in your pursuits.

I am, Sir, your most obedient servant,

JOHN HUNTER.

Leicester Square, March 22d, 1792.

Moreover, this being a patent medicine, and subject to an agreement, it is conceived that it would neither be regular nor consistent to give its formula in this place. But gentlemen who choose to take the trouble, may see the specification in the Patent Office : when it will be observed, that the two medicines recommended by Dr. Cullen, for preventing the operation of infection, viz. Peruvian bark, and camphire, enter into its composition. Upon this occasion it is proper to state that this medicine has been essentially improved since the date of the patent.

In the patent, the following words occur :

“ *Sixthly*, As a powerful antiseptic, in cases of putrid bile, and for counteracting infection, or preventing and curing putrid, malignant, and pestilential fevers, sore throat, viz. *Cynanche maligna*, &c. prevailing in prisons, crowded filthy places, hospitals, ships, hot and unhealthy climates,” &c.

Further, as to prevention. The reader will have observed the effects of the fumes of burning brimstone upon the variolous matter, insects, animalculæ, &c. as well as the effects of the flowers of sulphur,
applied

applied externally, for similar ends. What I have now to propose, in addition, for preventing the operation of infection, is the internal use of the flowers of brimstone. But here it is proper to observe, that I am induced to do so from analogy only, not having had sufficient experience to enable me to draw any certain conclusions as to the effects of sulphur, administered in this way for such purposes: there are, however, good grounds for the trial of it. Dr. Lewis, in his valuable *Materia Medica*, says of sulphur:

“ Pure sulphur, taken in doses of ten grains to a drachm or more, gently loosens the belly, and promotes perspiration. It seems to pass through the habit, and manifestly transpires through the skin, as appears from the sulphureous smell of persons who have taken it, and silver being stained in their pockets to a blackish hue, as by the vapour of sulphureous solutions.

“ In consequence of these properties, and of this subtilty of parts, it promises to be of great medicinal powers; but its particular virtues, experience has not as yet clearly determined. In the itch indeed it is a certain remedy, whether externally or internally applied.

“ The flowers of sulphur in substance seem to be preferable for internal use to any of the preparations:

they are certainly more safe, and perhaps not less effectual; as they do not heat or irritate the first passages, and yet are evidently dissolved in the body, and carried through the habit."

Professional men will have found the effects of the flowers of sulphur, taken internally, to have been invariably the same as above described by Dr. Lewis. In the course of the last thirty years, I have repeatedly had occasion to take the washed flowers of sulphur, for a complaint commonly called the blind piles, in the quantity of a tea-spoonful, or a drachm mixed in about a gill of new milk, in the morning fasting, several days successively, without the least inconvenience during its operation, and with benefit as to the complaint. I always desisted from its use, whenever I found that the silver case of my watch was discoloured, concluding that I was then duly sulphurized. But I do not recollect that, upon such occasions, any one perceived that I had the sulphureous odour about me.

If the flowers of sulphur taken into the stomach, undergoing certain changes in the digestive organs, and being thus changed, are absorbed into the circulating system, and producing such effects as the destruction of the animalculæ causing the itch, it is not improbable, from the whole view of its general effects
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in a variety of instances, but that its internal use may enable the body to resist the operation of infection or contagion. At any rate, as the trial of it in this way is perfectly safe, it would seem advisable, that it ought not to be omitted by persons who are unavoidably exposed to pestilential infection.

Upon the above grounds, and for the same reasons, it is probable that the flowers of sulphur, applied to the skin of the human body, would be useful in preventing the operation of infection. An ointment composed of two ounces of the flowers of brimstone, and four ounces of hogs-lard, melted and mixed together, may be used for this purpose. The parts most proper to be anointed, are the hams, groins, armpits, and bendings of the arms. About the size of a small nutmeg of this ointment should be rubbed upon each of those parts at bed-time, three or four successive nights, by persons exposed to infection, observing to wear the same linen and clothes for a due time.

Upon the whole, it may be inferred, that infections or contagions may be readily accounted for from the common operations and laws of nature. The all-wise providence of God does not suffer elementary matter to remain idle and useless, but raises it again for fresh purposes and combinations. The two sorts of infection
arise

arise from matters in peculiar states of putrefaction. 1st, Vegetable matters, putrefying under certain modes and circumstances, give out effluvia capable, when applied to the bodies of men, of inducing intermittent fevers. 2d, Animal matters, putrefying under the like modes and circumstances, send forth vapours, which, when received into the human system, produce epidemical fevers of the most mortal kind. If, for example, a number of persons, living constantly in the same place, were to wear the same shirts, drawers, and stockings, unchanged, for three months, and sleep in the same sheets during the said three months; and if these shirts, drawers, stockings, and sheets, thus worn three months, and saturated or imbued with perspirable matter and other animal excretions, were thrown together promiscuously into a heap in a confined place, or tied up into a bundle and suffered to remain some weeks in that condition, it is highly probable that, by some peculiar putrefactive fermentation or intestine process, the *plague* or some other malignant and contagious disease would be produced by the effluvia generated by such fermentation, commotion of particles, &c.

From every view of this subject, then, it appears incontrovertibly that constant and persevering ventilation

lation and cleanliness, in all their bearings and objects, and in the most extensive sense of these words, will prove the most certain preventive of the generation of infection or contagion.

If strict attention to these circumstances be advisable amongst mankind, generally, how much more necessary must it be to prevent filth, stagnant air, and accumulation of noxious vapours, in prisons, hospitals, ships, &c. and in the crowded and confined abodes of the indigent, especially in great and populous cities? It is not only necessary that persons, in such situations, should be furnished with the means of cleanliness, but they ought to be encouraged or compelled to live cleanly in all respects. Beds and bedding should be frequently and well aired. In the navy, it is the general practice, in fine weather, that is, dry weather, to pipe up all hammocks every morning, when each man rolls up his mattress, blanket and rug, with the hammock, into an oblong bundle, and lashes the whole very tight and firm with a cord. These bundles of bedding are then arranged close together in rows, about the quarters, &c. of the ship, forming barricadoes, which are proof against musket and grape shot. In the evening, they pipe down all hammocks, when every one finds out his own, and takes care of it.

it. Now, as bedding, under such circumstances, cannot be well aired; and as it would be impossible to air them all at the same time in any other way, it is recommended that a convenient number be spread out and exposed to the dry open air, daily, upon the booms, in the boats, &c. in succession, till the whole shall have been thus duly ventilated. The frequency of this measure will be attended with the best effects.

It ought to be a rule in every family, &c. that body-linen, including stockings, nightcaps, neckcloths, sheets, table-linen, &c. and especially the foul linen of the sick, not labouring under infectious diseases, should not remain any length of time together in heaps, but be washed, got up, and put away clean and dry, as soon as possible. As to the linen of persons labouring under, or who have died of infectious maladies, it should be first fumigated with the fumes of burning brimstone, and then soked and scoured in quick-lime and water, as has been already pointed out.

With respect to the necessaries of public buildings, such as of workhouses, &c. if the necessary is included in the inhabited building, and not supplied with water to wash away the soil, the soil ought to be removed as often as it becomes offensive: and if alternate layers
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of fresh or newly burnt quick-lime were thrown into such necessaries occasionally, so as at last to be equal in quantity to the soil, not only the stench would be greatly overcome thereby, but the lime thus treated would be found to be a rich and excellent manure; and, in a chemical sense, might properly be called ammoniated and phosphorated lime, containing, in abundance, elements altogether fit for the purposes and operations of vegetation. It is conceived that such a mass would be too rich of itself, and, therefore, that it ought to be worked up with some poor compost, and suffered to remain a due time in the open air.

Quick-lime, by exposure to the air, has the property of attracting and absorbing fixed air and vapours nearly equal to its weight. If a ton of chalk be fairly and thoroughly burnt into quick-lime (which is not always the case; there being generally numerous pieces of chalk found amongst quick-lime, which had escaped the action of the fire) its weight, when converted into quick-lime, will be about 11 cwt. only; so that by calcination it loses about 9 cwt. By due exposure to the atmosphere this 11 cwt. will have absorbed 9 cwt. of fixed air and moisture: whence, if 11 cwt. of well burnt and fresh quick-

quick-lime were thrown upon the soil in a necessary, and suffered to remain a due time, it would be equal in weight to one ton, when removed. But in this case, the quick-lime will have sucked up or absorbed vast quantities of ammoniacal and urinous salts, and prove very different from lime slaked in the open air. I shall conclude these remarks upon lime, by observing, that as quick-lime, fresh drawn from the kiln, rapidly gains considerable weight, it should be taken away as soon as possible for the purposes of lie, for scouring infected clothes; whitewash; for the soil of necessaries; and in short for the purposes of agriculture, mortar, &c.; for it has been shewn, that a ton of quick-lime, exposed some days to the atmosphere, will have acquired several hundred weight in addition, and may, therefore, neither be so useful nor profitable. In fact, when quick-lime has been a long time exposed in the open air, it becomes so much pulverized chalk.

THE END.